# Chord Environmental Ltd

Nigel Thornton
Soiltechnics
Cedar Barn
White Lodge
Walgrave
Northants NN6 9PY

**Your Ref:** 38 Heath Drive
**Our Ref:** 1127/LJE220414

For the attention of: Nigel Thornton

23 April 2014

**38 Heath Drive BIA – Review of Subterranean Flow section**

Dear Nigel,

Further to our discussions and the instruction to proceed from your client (Zen Developments) I have undertaken a review of the Subterranean Flow section of the Basement Impact Assessment prepared by Soiltechnics for the proposed 38 Heath Drive basement development.

I have reviewed the proposed basement development against the requirements of the Camden BIA guidance set out within DP27 and CPG4.

Chord Environmental specialise in the provision of hydrogeological services with extensive experience in the UK supporting both private and public sector clients. I am a hydrogeologist and have a BSc. in geology from the University of Bristol, a MSc. in hydrogeology from the University of East Anglia and am also a Chartered Geologist and fellow of the Geological Society. I am Managing Director at Chord Environmental and previously was a Technical Director with Paulex Environmental Consulting and managed Hyder Consulting (UK) Ltd's groundwater team.

I have been a hydrogeologist for 17 years. During that time I have worked as a groundwater consultant. Much of my career has been spent assessing the impact of development on the quality and quantity of groundwater resources. I have worked for both promoters and regulators of schemes and have acted as an expert witness for the Highways Agency.

## Development proposal

I understand the proposed development comprises the demolition of the existing property and construction of a five storey building with a single storey deep basement extending approximately 2.8m below the proposed ground floor level. The basement will be located beneath the proposed building but will extend beneath the rear garden to form a swimming pool and associated changing areas. The subterranean development beneath the existing garden will extend to a depth of approximately 6.5m below ground levels.

## Environmental Site Setting

The BIA screening assessment has identified 38 Heath Drive to be underlain by the Eocene London Clay as shown on the British Geological Survey 1:50,000 scale map (Sheet 256 – North London) to a depth of approximately 60m. The London Clay is classified as Unproductive Strata by the Environment Agency, strata with low permeability that have negligible significance for water supply or river base flow.

Figure 11 of the "Camden Geological, Hydrogeological and Hydrological Study", shows a tributary of the former Westbourne watercourse to have run along Heath Drive in the vicinity of the site. The Westbourne, together with a number of other historic watercourses, originated from springs fed by groundwater discharge from the Bagshot Formation sands located a few hundred metres to the north and northeast of 38 Heath Drive. The Westbourne was perched on the very low permeability London Clay and could not receive groundwater baseflow from it. Subsequently the Westbourne has been incorporated into the surface water sewer system beneath the West Hampstead area and discharges into the Thames to the west of Chelsea Bridge.

The very low permeability of the London Clay results in correspondingly very low rates of rainfall infiltration and very high rates of rainfall runoff.

## Subterranean (Groundwater) Flow Screening Assessment

The BIA screening assessment followed the CPG4 guidance screening questions. I have commented on the answer to each question below.

- **Question 1a: Is the site located directly above an aquifer?**

  As the Site is mapped as being underlain by a significant thickness of London Clay, designated as Unproductive Strata by the Environment Agency, I agree it is not located above an aquifer. The geology of the areas is well understood and the published geological map is based on extensive data.

- **Question 1b: Will the proposed basement extend beneath the water table surface?**

  The London Clay is not capable of transmitting groundwater but because it is predominantly clay, it does hold water. As such there is not generally a water table present within it. Monitoring boreholes drilled within the London Clay do slowly fill with groundwater over time; however there is little or no hydraulic continuity between boreholes due to the very low permeability of the clay and ability of the clay matrix to hold or adsorb water.

- **Question 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?**

  Although the River Westbourne is shown to flow within c.10m to the west of the Site, this watercourse is not present at surface and has been culverted to form part of the local surface water sewer. The London Clay is not capable of providing groundwater baseflow to watercourses and is classified Unproductive Strata. The proposed basement would therefore not prevent groundwater flow discharging to the Westbourne.

- **Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?**

  The Site is outside the hydrological catchment of Hampstead Heath ponds.

- **Question 4: Will the proposed development result in a change in the proportion of hard surfaced / paved area?**

  The proposed basement development does appear to result in a net increase in building footprint. In relation to the assessment of the proposed development on groundwater flow, the purpose of this question is to determine whether rainfall recharge will be reduced. However, the London Clay's low permeability results in a negligible rate of rainfall infiltration and a correspondingly high rainfall runoff rate, therefore the proposed basement would not have an impact on groundwater resources.

- **Question 5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to ground (e.g. via soakaways and/or SUDS)?**

  The lowly permeable nature of the London Clay strata is unsuitable for receiving surface water discharge to ground due to extremely low infiltration rates.

- **Question 6: Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?**

  I agree there are no mapped local groundwater dependent ponds or spring lines present within 100m of the Site. This is consistent with the geology and hydrogeology of the area.

## Conclusions

The BIA screening assessment has characterised 38 Heath Drive with respect to its groundwater site setting. As the site is underlain by low permeability London Clay, the geological and hydrogeological setting of 38 Heath Drive is not sensitive with respect to groundwater resources or flow.

The purpose of the BIA subterranean or groundwater flow screening assessment is to identify the potential for the proposed development to cause groundwater impacts and subsequently identify areas which require further investigation. No potential adverse impacts have been established by the assessment. Although the proposed basement would result in a larger built footprint, this would not have any negative groundwater impacts within the London Clay.

Yours sincerely,

**John Evans BSc MSc CGeol.**

Director